DOCUMENT RESUME

ED 418 879 SE 061 361

TITLE	Science Feedback 3. 5-14 Links.
INSTITUTION	Scottish Office Education and Industry Dept., Edinburgh.
ISBN	ISBN-0-7480-5898-2
PUB DATE	1998-00-00
NOTE	27p.; For related document, see SE 061 364.
PUB TYPE	Reports - Research (143)
EDRS PRICE	MF01/PC02 Plus Postage.
DESCRIPTORS	Academic Achievement; Elementary Secondary Education; Environmental Education; Foreign Countries; *Rating Scales; Science Education; *Scores; *Sex Differences; *Student Attitudes; *Student Evaluation; Tests
IDENTIFIERS	*Scotland

ABSTRACT

This publication presents information derived from the fourth Assessment of Achievement Programme (AAP), a survey of students' attainment in science (Scotland, 1996). The main AAP objectives are to describe national levels of attainment and to provide evidence of changes in these levels over time. This booklet was developed primarily as an information resource for teachers to serve as a tool for improving teaching and learning. Assessment tasks were used with a sample of students at three stages: (1) Primary 4; (2) Primary 7; and (3) Secondary 2. The tasks were matched against Strands, Targets and Levels from the science component of National Guidelines for Environmental Studies. In this way the performance of students at different levels could be assessed in the five Strands: (1) Knowledge and Understanding; (2) Planning; (3) Collecting Evidence; (4) Recording and Presenting; and (5) Interpreting and Evaluating. Averaged scores are presented by grade for each strand. Gender-related differences are analyzed as well. Results from a pilot study portion of the 1996 survey to investigate students' attitudes towards science and learning science are also included. Scores are analyzed and results summarized under a Key Findings heading for each strand, for gender differences, and for attitudes to learning science. Results of a questionnaire sent to all participating schools are also presented. A list of questions on teaching and learning issues is provided for reflection and discussion. (PVD)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED 418 879

[redacted] 4 SE
ks

SCIENCE

Feedback 3

PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL HAS BEEN GRANTED BY

S. MacKenzie

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

1

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

X This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

SE041361

BEST COPY AVAILABLE

AATD

WHAT IS *FEEDBACK?*

Feedback is an information resource for teachers. It is derived from the findings of the Assessment of Achievement Programme (AAP) which is a major research programme funded by the Scottish Office Education and Industry Department.

Feedback can be used:

- As a source of information about the achievement of pupils in Science.
- When reflecting on achievement in your classroom.
- When reviewing teaching plans in relation to attainment targets.
- When considering effective teaching strategies in Science.
- When assessing class work and reviewing performance in areas of the Science curriculum.
- When preparing assessment materials.
- As a stimulus for discussion at staff meetings or in-service days.
- With student teachers as part of their professional training and as an aid to classroom preparation.

CONTENTS

	page
Introduction	1
The 1996 Assessment Framework	
Knowledge and understanding: *Examples 1 – 3*	3
Planning: *Example 4*	5
Collecting evidence: *Examples 5 – 7*	6
Recording and presenting: *Examples 8 – 10*	8
Interpreting and evaluating: *Examples 11 – 13*	10
Investigating	12
Other topics	
Gender-related differences in performance	13
School questionnaires	14
Attitudes to learning	15
Teaching and learning issues	17
Other issues	18
Further reading	19
AAP publications	20

Copyright © SOEID 1998
ISBN 0 7480 5898 2

Science Feedback 3 may be photocopied for your own use.

INTRODUCTION

The Assessment of Achievement Programme

The fourth Assessment of Achievement Programme (AAP) survey of pupils' attainment in science was carried out in 1996 by researchers at the University of Strathclyde, Jordanhill Campus. As in other AAP surveys, the assessment tasks were used with a sample of pupils, selected to be representative of all pupils in Scotland, at three stages – Primary 4, Primary 7 and Secondary 2.

The assessment framework was based on the science Strands of the 5-14 Environmental Studies Guidelines covering knowledge and understanding and a number of skills important for successful scientific enquiry. These were assessed in written and practical tasks.

AAP and the 5-14 Guidelines

The tasks used in the AAP science survey were matched against Strands, Targets and Levels from the 5-14 guidelines for the science component of *National Guidelines for Environmental Studies* (ES 5-14). In this way the performance of pupils at different levels could be assessed in the five Strands: *Knowledge and Understanding* (KU), *Planning* (P), *Collecting Evidence* (CE), *Recording and Presenting* (RP), *Interpreting and Evaluating* (IE). A number of Targets within Strands could not be effectively assessed using the AAP tasks. These Targets are more effectively assessed by the classroom teacher over a period of time.

A scoring system was developed which gave an *index of achievement* for each task between 0 and 1. Broadly speaking, a low figure indicates little competence on a particular Target while a higher index reflects more secure knowledge and understanding. Similarly, within a task the percentage of pupils achieving an index of achievement of less than, say, 0.35 could be categorised as *showing little understanding*, 0.35 – 0.8 as *making steady progress* and 0.8-1.0 as having a *secure grasp*.

Interpreting the Levels

In the 5-14 programme pupils can be expected to attain the following levels of performance:

Level A	attainable by almost all P1-P3 pupils
Level B	attainable by some P3 pupils, or even earlier, but certainly by most in P4
Level C	attainable by most P4-P6 pupils
Level D	attainable by some P5-P6 pupils, or even earlier, but certainly by most in P7
Level E	attainable by some P7-S1 pupils but certainly by most in S2

There are additional factors in *Knowledge and Understanding* and here the expectations are:

Level A secure knowledge and understanding of the key features for P1-3

Level B Level A plus steady progress on the key features for P4-6

Level C secure knowledge and understanding of the key features for P1-6

Level D Level C plus steady progress on the key features for P7-S2

Level E secure knowledge and understanding of the key features for P7-S2

For all Strands the focus is on those proportions which constitute ***almost all***, ***most*** and ***a few***. The following cut-off figures were established for the 1996 survey:

almost all = 90 per cent of pupils

most = 75 per cent of pupils

a few = 15 per cent of pupils.

(Unless otherwise stated scores and key findings refer throughout to **most** pupils).

This booklet

- outlines the main findings of the 1996 AAP science survey and gives examples
- gives the 5-14 Strands and Levels assessed by the examples
- draws together learning and teaching issues.

KNOWLEDGE AND UNDERSTANDING

The knowledge and understanding Targets are specified as key features by stage bands in the 5-14 guidelines and the expected level of performance is stated in the *Knowledge and Understanding* Strand (see page 2).

The Attainment Outcomes are:

AO1 Understanding Living Things and the Processes of Life

AO2 Understanding Energy and Forces

AO3 Understanding Earth and Space

In this section there were a total of 33, 54 and 71 tasks of differing levels, across the three Attainment Outcomes, tackled at P4, P7 and S2 respectively.

AO1: Understanding Living Things and the Processes of Life

EXAMPLE 1

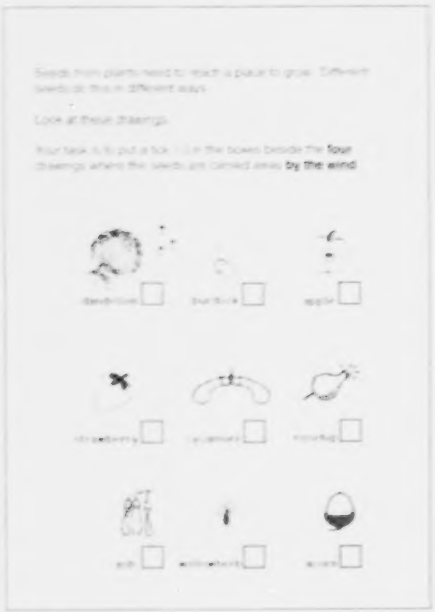
This task assesses the key feature for the stage P4-6, *dispersal of fruits and seeds by animals (externally/internally), by wind and by self.*

Most P4 pupils scored 0.7

Most P7 pupils scored 0.83

Most S2 pupils scored 0.82

As in the previous survey, the most commonly selected wrong answers at all three stages were burdock, rosehip and acorn.


Seeds from plants need to reach a place to grow. Different seeds do this in different ways.
Look at these drawings.
Your task is to put a tick in the boxes beside the four drawings where the seeds are carried away by the wind.

AO2: Understanding Energy and Forces

EXAMPLE 2

This task assesses pupils' understanding of air resistance for stages P4-6.

Most P4 pupils scored 0.48

Most P7 pupils scored 0.81

14 per cent of P4 pupils confused wind with air and 23 per cent simply reiterated the question.

Sandra and Jan have identical toy figures. Jan makes a parachute for her figure.
They stand at the top of the stairs and drop the figures. Sandra's toy falls quickly to the ground but Jan's toy is much slower.
Why do you think the parachute makes Jan's toy fall more slowly?
Write your answer here

AO3: Understanding Earth and Space

EXAMPLE 3

This task assesses knowledge of oxygen and its properties from the target for P7-S2.

Most P4 pupils scored 0.36

Most P7 pupils scored 0.61

Most S2 pupils scored 0.89

Nita lit a candle and let it burn for a few seconds. Then she placed a jar upside down over the candle and the flame burned for a few seconds then went out.
Why do you think the flame went out?
Write your answer here

Key findings

- Most P4 pupils performed at Level B
- Most P7 pupils performed at or were approaching Level D. Significant areas of weakness included AO2: Understanding Energy and Forces
- Most S2 pupils attained Level D but showed considerable weaknesses in AO2 and AO3. S2 pupils were failing to meet 5-14 expectations of Level E
- Most S2 pupils were making steady progress on P7 – S2 content
- There were wide variations in performance levels within Strands across all three stages.

PLANNING

Six sub-categories of the Strand *Planning* were identified within the 1986 AAP Science framework.

P1	Question raising
P2	Identifying information sources and resources
P3	Sequencing plans
P4	Planning for recording and reporting
P5	Anticipating problems
P6	Planning for safety and hygiene

As AAP focuses on the individual and what she/he can do unsupported, tasks were at Levels D/E because Levels A/B required interaction with the teacher.

It was felt that much of this Strand could not be reliably assessed within the constraints of national monitoring and is more appropriately dealt with by the teacher in ongoing classroom activities. As a result there are no key findings for this section.

EXAMPLE 4

This Level D/E task assesses the target. *decide on a sequence of tasks or procedures checking for possible difficulties and adapting where required.*

Most P4 pupils scored 0.32

Most P7 pupils scored 0.39

COLLECTING EVIDENCE

A number of sub-categories of the Strand *Collecting Evidence* (*CE*) were identified within the 1996 AAP Science framework. These were:

- *CE1* Recognising similarities and differences
- *CE2* Recognising changes
- *CE3* Extracting information
- *CE4* Using simple techniques
- *CE5* Estimating and measuring
- *CE6* Collecting evidence fairly and safely.

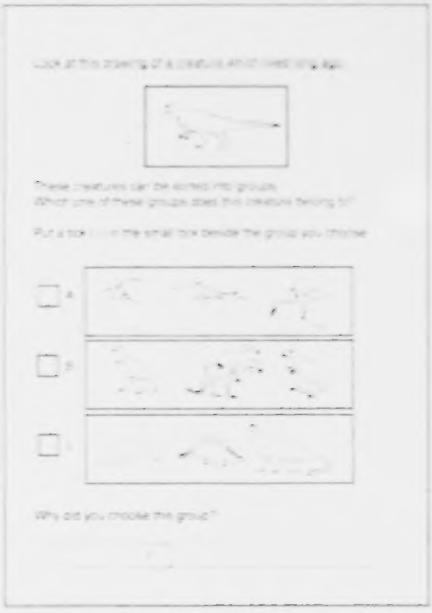
EXAMPLE 5

In one Level C task pupils were asked to: *observe living things, objects and phenomena, noticing obvious features, and group by a single attribute.*

Most P4 pupils scored 0.56

Most P7 pupils scored 0.72

In the Level C example shown, using a key to identify dinosaurs, P7 pupils scored 0.93 and S2, 0.95.



EXAMPLE 6

In this example pupils were asked to select information to answer specific questions.

Most P4 pupils scored 0.84

Most P7 pupils scored 0.96

In a similar task, most S2 pupils scored 0.98.

All three stages attained Level C on this task.

Practical Tasks

Pupils were also presented with 12 *Collecting Evidence* tasks in the Practical Circuits at primary and 14 at secondary.

EXAMPLE 7

In this Level C practical task pupils were expected to follow the instructions to create a chromatogram of colour from a small sweet and match it with one of three others given.

Most P4 pupils scored 0.67

Most P7 pupils scored 0.78

Most S2 pupils scored 0.8

Tidy up when you have finished

Key Findings

- Most P4 pupils were successful on a minority of written and practical tasks at Level B, but were making progress towards Level C
- Most P7 pupils were successful on Level B tasks and on the majority of Level C tasks. They were not attaining Level D but were making steady progress towards Levels D and E
- Most S2 pupils were successful on all but a few Level E tasks.

RECORDING AND PRESENTING

Two sub-categories were generated from the ES 5-14 Strand *Recording and Presenting (RP)* for the 1996 AAP Science framework:

RP1 Recording in a variety of formats

RP2 Presenting in a variety of formats.

There were no RP2 tasks as these could not be assessed in the survey. It is worth remembering that relatively few tasks were tackled at each stage so conclusions in this Strand should be treated with caution.

EXAMPLE 8

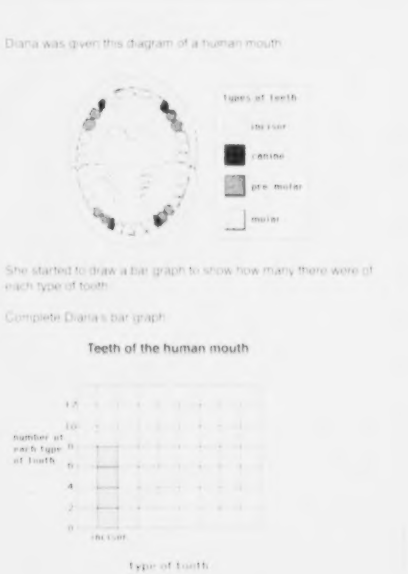
In this Level C written task pupils were expected to use information in the drawing to construct a bar graph showing the numbers of different types of teeth.

Most P4 pupils scored 0.79

Most P7 pupils scored 0.97

Most S2 pupils scored 0.96

Almost all P7 and S2 pupils attained Level C on this task.

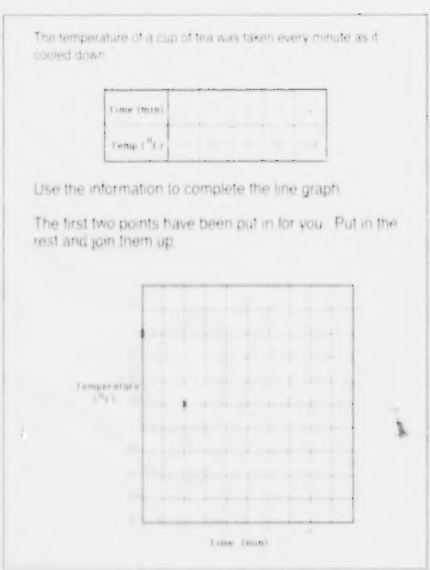


EXAMPLE 9

In this Level D task pupils had to construct a line graph from data given in a table.

Most P7 pupils scored 0.58

Most S2 pupils scored 0.76


The temperature of a cup of tea was taken every minute as it cooled down.
Time (min)
Temp (°C)
Use the information to complete the line graph.
The first two points have been put in for you. Put in the rest and join them up.
Temperature (°C)
Time (min)

A number of tasks were also set in the Practical Circuits.

In this Level D task primary pupils were expected to count the number of different types of nuts, bolts etc. and to construct a bar graph to display their findings.

Most P4 pupils scored 0.75

Most P7 pupils scored 0.92

EXAMPLE 10

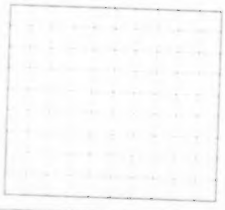
Look at the objects in front of you.
Sort them into 4 groups.

There are **two** parts to this task.

1. Complete this table to show how many of each you found.

bolts	nuts	nails	washers

2. Use the numbers in the table to draw a barchart here.
Remember to label the axes.



Put the objects back in the box before you leave the station.

Key findings

- Most Primary 4 pupils attained Level B and C and were working towards Level D
- Most Primary 7 pupils attained Levels B, C and D although they did have some problems with line graphs
- Almost all S2 pupils attained Level C on pencil and paper tasks but most were marginally below Level D. Most S2 pupils were working towards Level E but had some way to go.

INTERPRETING AND EVALUATING

There were two sub-categories in the ES 5-14 Strand *Interpreting and Evaluating (IE)*:

IE1 Assigning meaning

IE2 Evaluating evidence

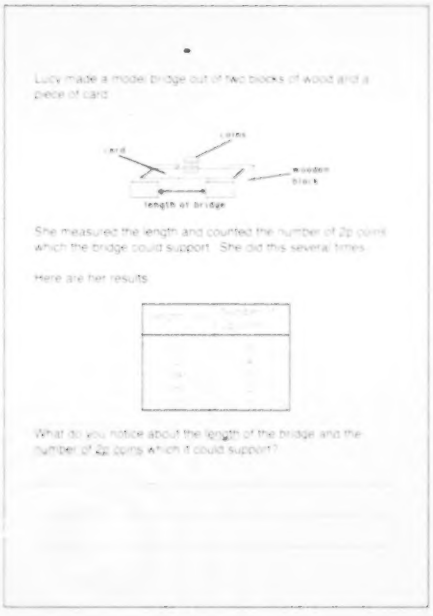
EXAMPLE 11

In this Level B task pupils had to identify the relationship given by the data.

Most P4 pupils scored 0.38

Most P7 pupils scored 0.58

Most S2 pupils scored 0.84


Lucy made a model bridge out of two blocks of wood and a piece of card.
card
coins
wooden block
length of bridge
She measured the length and counted the number of 2p coins which the bridge could support. She did this several times.
Here are her results.
What do you notice about the length of the bridge and the number of 2p coins which it could support?

The second type of *Interpreting and Evaluating* tasks were all of a similar structure and assessed understanding of the 5-14 target *distinguish between fact supported by evidence and opinion and speculation.*

EXAMPLE 12

This Level C task was tackled by pupils in P4 and P7.

Most P4 pupils scored 0.59

Most P7 pupils scored 0.76

Five people looked at this picture of an apple tree in a field.
Which one person is describing what can be seen in the picture?
Tick (√) the box next to the one person you choose.
Jill says "The wind has knocked some apples off the tree"
Nick says "The apples on the ground are bad"
Kirsty says "The apples on the tree are ready for picking"
Alan says "The are apples on the ground and on the tree"
Jane says "The tree could not hold all its apples"

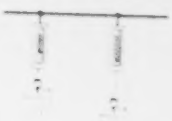
EXAMPLE 13

This Level D task was tackled by pupils in P7 and S2.

Most P7 pupils scored 0.39

Most S2 pupils scored 0.36

Five people looked at this picture of blocks hung on spring balances. The blocks are the same size.



Which **one** person is describing what can be seen in the picture?

Tick (✓) the box next to the **one** person you choose.

- ☐ Euan says: "The two blocks are of different weights"
- ☐ Jack says: "One of the balances is not working properly"
- ☐ Sara says: "One of the balances is pulled out more than the other"
- ☐ Ian says: "The two blocks are made of different materials"
- ☐ Lyn says: "The two balances are marked with different scales"

The most common error which pupils at both stages made was to choose the inferential statement rather than the observational one which they were asked to choose.

Key Findings

- Most pupils at all three stages were operating well below 5-14 expectations
- Pupils at all stages need more experience of interpreting data presented in a variety of formats
- Pupils tended to 'jump to conclusions'.

INVESTIGATING

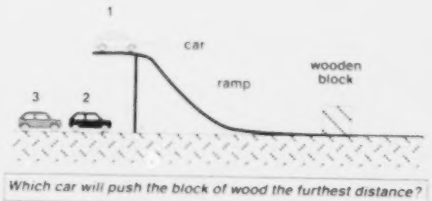
A sub-sample of pupils at all three stages undertook a more extended investigation conducted on a one-to-one basis with a trained Field Officer. Each child was given one of two investigations to carry out. Once it was clear the child understood what was expected of them, they were left to carry out the investigation while the Field Officer observed and checked procedure against a standard check-list.

These extended investigations covered a number of ES 5-14 Strands. Statistical analysis was not carried out because the sub-sample of pupils was not representative of the population. But findings indicate some problems pupils encounter in carrying out investigations and can be useful in planning teaching and learning.

The Investigations

RACE TRACK

The *Race Track* investigation asked primary pupils to find out which car pushed the block the furthest distance. Secondary pupils used small balls of differing weights instead of cars. Additional struts for the ramp were also supplied, allowing the angle of the slope to be altered. Secondary pupils had to find out which combination of ball and height pushed the block furthest.



Which car will push the block of wood the furthest distance?

RISING DAMP

In *Rising Damp*, pupils had to find out which grade of filter paper allowed water to rise the fastest. This was made more difficult for secondary pupils by using two different liquids.

Key Findings

- Pupils at each stage generally performed at a higher level on *Race Track* than on *Rising Damp*
- P4 and P7 indicated a lack of awareness of the need to control variables to ensure a 'fair test'
- Many P4 and P7 pupils failed to record results. Final conclusions were based on reflection on their observations rather than interpretation of data recorded.

GENDER-RELATED DIFFERENCES IN PERFORMANCE

In each survey there is an analysis by gender. Differences at, or less than, the 5 per cent level of significance were taken to be statistically significant.

Table A shows the number of written tasks and the number of gender-related significant differences at each stage.

TABLE A: Number of tasks and number of significant differences at each stage.

	P4	P7	S2
number of tasks	60	100	125
number of significant differences	11 (18%)	33 (33%)	56 (45%)

A clear gender-related pattern of performance could be seen from P4 through to S2.

At P4 girls performed significantly better than boys on eight tasks. Of these eight tasks, four were in *Knowledge and Understanding* and the remaining four were spread across the other four process Strands. Boys performed significantly better than girls on three tasks, all in *Knowledge and Understanding*.

At P7 girls performed significantly better than boys on 19 tasks, four in the *Knowledge and Understanding* Strand and the remaining 15 across the four process Strands. Boys performed significantly better than girls on 14 tasks, 12 of which assessed *Knowledge and Understanding* and two *Collecting Evidence*.

At S2 girls performed better than boys on 30 tasks, four of which were in *Knowledge and Understanding*, the remainder belonging to the four process Strands. Boys performed significantly better than girls on 26 tasks, 23 of which were from *Knowledge and Understanding*, one from *Collecting Evidence* and two from *Interpreting and Evaluating*.

Differences were also analysed by Attainment Outcome.

At P4, the context of six of the eight tasks on which girls performed better belonged to AO1, the remainder belonging to AO3. The context of the three tasks on which boys performed better were spread across AO2 and AO3.

The context of 16 of the 19 tasks at P7 on which girls performed better belonged to AO1. Only one of the 14 tasks on which boys performed better belonged to AO1.

At S2 a similar pattern emerged with the context of 14 of the tasks on which girls performed better belonging to AO1, seven belonging to AO2 and nine to AO3. Only one of the 26 tasks on which boys performed better belonged to AO1 with 14 from AO2 and 11 from AO3.

Key Findings

In written tasks:

- clear patterns of gender-related differences which increased with age
- girls performed better on process-based tasks, boys on knowledge-based tasks
- girls tended to perform better on AO1 tasks, boys on AO2 and AO3.

In practical tasks:

- no clear pattern of difference at any stage.

SCHOOL QUESTIONNAIRES

A questionnaire sent to all participating schools produced the following three points:

Policy for Science

- Only 18 per cent and 17 per cent of primaries and secondaries respectively said that the Environmental Studies Guidelines were fully operational within their school. A further 64 per cent and 78 per cent respectively said they were under consideration.

Learning and Teaching Science

- Some 60 per cent of primary schools claimed to be devoting a reasonable amount of time to science, a considerable increase on 1993. However, about 40 per cent were still giving insufficient time to science.
- Virtually all secondary schools were giving appropriate time to science.

Goals of Science

- Primary teachers now perceived 'understanding basic science concepts' as one of the five (of 12) most important goals for science teaching. This was not one of their top five goals in 1993. However, 'enjoyment of science-based activities' and 'a questioning attitude towards their surroundings' remained the two most important goals as perceived by primary teachers.
- As in 1993 secondary teachers perceived 'understanding of basic science concepts' as the most important goal of science teaching, with 'enjoyment of science-based activities' third behind 'development of problem-solving skills'.

ATTITUDES TO LEARNING SCIENCE

A pilot study was carried out in the 1996 survey to investigate pupils' attitudes towards science and learning science. A questionnaire, given to all pupils, was designed to find out:

- how confident pupils were in their knowledge and understanding of common science topics and their perceived main sources of this information
- pupils' preferences across the three science Attainment Outcomes
- the variety of learning activities that might occur and pupils' views of these activities. This part was given to P7 and S2 only.

There were clear differences in gender preferences. Girls remained relatively stable over time with greatest preference for AO1 topics, boys displayed an increasing preference for physical science topics with a corresponding decrease in preference for AO1 topics (Figures 1 and 2).

FIGURE 1

Boys' preferences for topics

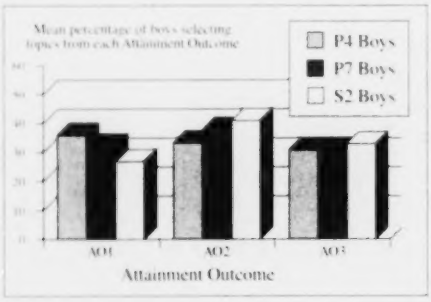
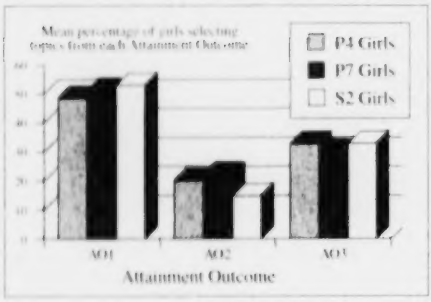


FIGURE 2

Girls' preferences for topics



Key Findings

- Pupils at all stages expressed greatest confidence in AO1: Living Things and the Processes of Life . The gap between Attainment Outcomes narrowed in P7 and again in S2, perhaps because of increased teaching focus on physics and chemistry topics as pupils get older.
- Confidence in knowledge of all Attainment Outcomes noticeably decreased between P4 and S2.
- S2 pupils depended on school as their main source of science information. There seemed to be no well-established alternatives to sustain interest and knowledge outside the science classroom.
- Girls remained fairly constant in preferences within AO1: *Living Things and the Processes of Life*. Boys tended to prefer physical science-based topics as they grew older.
- S2 pupils had more opportunity than P7 pupils to follow their own investigations in class.
- 70 per cent of S2 pupils said they never used computers in science and 19 per cent only sometimes. This contrasts with 53 per cent and 39 per cent of P7 pupils. 8 per cent of P7 pupils said they used computers often.

FOR REFLECTION AND DISCUSSION

TEACHING AND LEARNING ISSUES

Knowledge and Understanding

- It can be difficult to give balance across the three Attainment Outcomes. How can weaknesses in specific areas be addressed?
- What approaches can be used to address the apparent lack of progress between P7 and S2? Closer links between primary and secondary schools?

Planning

- Do you employ investigative strategies in dealing with science topics?
- How often do pupils plan and carry out their own investigations?

Collecting Evidence

- How can you develop the skills of 'fair testing' in the context of a practical investigation?
- How can younger pupils be encouraged to articulate their reasons for noticing similarities and differences? Observation games? Discussions?

Recording and Presenting

- How can younger pupils be encouraged to record their results during practical investigations?
- How can secondary pupils develop skills of recording and presenting in a variety of formats?

Interpreting and Evaluating

- How can pupils be encouraged not to 'jump to conclusions'? Class discussions? 'Detective' competitions?
- Can pupils be given more practice in interpreting data from their own, and other, investigations?

Pupils' Perceptions of Science

- How can we encourage older pupils to explore avenues other than school for learning about science? Exhibitions? Television? Work experience?
- Girls' attitudes to science remain constant but boys tend to change as they grow. Are the gender differences important? Can all pupils be encouraged to take a greater interest in the Attainment Outcomes?
- How can we make better use of computers in science, particularly in secondary schools? Business links?

OTHER ISSUES

- Do secondary teachers build on information received from the primaries? Do primaries provide sufficient information on what has been achieved up to P7?
- How can primary and secondary schools coordinate science teaching more?
- Has your school identified staff development needs and resourcing implications for science within 5-14? Can these be used to inform and develop the *Feedback* series?

FURTHER READING

Further details of the methods used in AAP surveys and the findings of the 1996 science survey are in the report entitled Assessment of Achievement Programme. Science 1996. The report was published by SOEID in March 1998 and is available from:

Dissemination Officer
Educational Research Group
Scottish Office Education and Industry Department
Victoria Quay
Edinburgh
EH6 6QQ

Tel: 0131 244 0167

Fax: 0131 244 8881

E-mail: dissemination@hmis.scotoff.gov.uk

Web site: http://www.hmis.scotoff.gov.uk/riu

For full information about the government's 5-14 curriculum guidelines, see *Curriculum and Assessment in Scotland, National Guidelines, Environmental Studies*. This is available from:

The Scottish Consultative Council on the Curriculum
Gardyne Road
Broughty Ferry
Dundee
DD1 5NY

Tel: 01382 455053

Fax: 01382 455046

E-mail: reception@scce.ac.uk

Web site: www.scce.ac.uk

AAP PUBLICATIONS

Other AAP publications include:

English Language Feedback – Assessment Tasks

English Language Feedback – 5-14 links

English Language Feedback 2

English Language Feedback 3 – Information for Teachers

Science Feedback – primary and secondary

Science Feedback 2 – 5-14 links

Science Feedback P4 & P7

Science Feedback P7 & S2

Mathematics Feedback – Secondary 2

Mathematics Feedback 2 – 5-14 links

Mathematics Feedback 3 – 5-14 links

Achievement of Scottish School Children in Mathematics – Performance of pupils at Primary Four

Achievement of Scottish School Children in Mathematics – Performance of pupils at Primary Seven

Achievement of Scottish School Children in Mathematics – Performance of pupils at Secondary Two

Summary Reports

Achievement of Scottish School Children in Mathematics 1983

Performance of pupils at Primary Four, Primary Seven and Secondary Two – English Language – ISBN 0 11 493467 3, £4.90, (HMSO)*

AAP Science 1987 – ISBN 0 11 493513 0, £4.90, (HMSO)*

AAP Mathematics 1988 – ISBN 0 11 493512 2, £5.80, (HMSO)*

AAP English Language Performance 1989 – ISBN 0 11 494144 0, £6.15, (HMSO)*

AAP Science 1990 – ISBN 0 11 494198 X, £6.70, (HMSO)*

AAP Mathematics 1991 – ISBN 0 11 494263 3, £6.70, (HMSO)*

AAP English Language 1992 – ISBN 0 11 495201 8, £8.00, (HMSO)*

AAP Science 1993 – ISBN 0 11 495295 7, £7.70, (HMSO)*

AAP Mathematics 1994 – ISBN 0 7480 3057 3 – no charge

AAP English 1995 – ISBN 0 7480 5807 9 – no charge

* These publications are available from:

HMSO Bookshop
71 Lothian Road
Edinburgh
EH3 9AZ

Tel: 0131 228 4181

Fax: 0131 622 7017

(Please quote ISBN number when ordering)

AAP science	*5-14 guidelines on environmental studies*
Content coverage	**Attainment outcomes for science**
Ourselves Plants and animals	Understanding living things and the processes of life
Energy	Understanding energy and forces
Materials Earth and space	Understanding earth and space
Conceptual development	**Strands**
Using knowledge	Knowledge and understanding
Investigating Observing Measuring	Planning Collecting evidence
Handling information	Recording and presenting
Inferring	Interpreting and evaluating

BEST COPY AVAILABLE

Copyright © SOEID 1998
ISBN 0 7480 5898 2
Science Feedback 3 may be photocopied for your own use.

BEST COPY AVAILABLE